

TITLE OF THE INVENTION

Gaming Machine

CROSS-REFERENCE TO THE RELATED APPLICATION

This application is based upon and claims a priority from the prior Japanese patent application No. 2002-307412, filed on October 22, 2002, entire contents of which are incorporated herein by reference.

BACK GROUND OF THE INVENTION

FIELD OF THE INVENTION

The present invention relates to a gaming machine, such as a pachinko machine or a slot machine (including a pachi-slo machine).

RELATED ART

Conventionally, a pachinko machine is known as a gaming machine where a game is performed by launching a ball onto a gaming board. In the aforementioned type of pachinko machine, the ball is launched onto the gaming board by operating a launching handle, and the launched ball collides with pegs as it falls. When the launched ball falls into a winning hole on the gaming board, a predetermined number of balls are paid out.

When the launched ball falls into a starting hole on the gaming board, a fixed image displayed on a display unit switches to an animation having a specific story, and a so-called variable display game starts out. The variable display game refers to the one simulatively played on a slot machine. A plurality of symbols displayed on the display unit is displayed so as to be stopped at a prescribed timing after each of the symbols has been variably displayed in the variable display game. A big winning occurs when the combination of stopped symbols forms a combination of big winning symbols. When the big winning occurs, a prescribed gain (e.g. a prescribed number of balls) is paid out or an advantageous state is provided to a player.

Recently, there is a pachinko machine, which displays various images (e.g. entertainment heroes/heroines, characters related to the hero/heroine, professional wrestlers, sumo wrestlers, a story which unfolds on the display unit and characters of the story) to increase the interest in the variable display game, or to excite the player by leaving them with a strong impression when the big winning has occurred. The display area or the display unit itself has been enlarged, so as to display dynamic images that provide a sense of being there, as the importance of images has been rising.

However, a bigger display unit for a larger display area results in a smaller portion for pegs to be arranged. Therefore, there was a problem that a motion of the

launched ball becomes monotonous because a falling route of the launched ball is limited, and the interest in the pachinko game decreases.

There is a pachinko machine in which a glass board with a liquid crystal sheet is disposed in front of the gaming board to solve the problem that the display area is limited by units or apparatuses located on the gaming board. This pachinko machine makes the liquid crystal sheet transparent/opaque by controlling the voltage added to the crystal sheet. The pachinko machine displays the image on the liquid crystal sheet by irradiating colored light from the reverse side of the liquid crystal sheet through optical fibers or color filters, or with light-emitting diodes (hereinafter LEDs) arranged in a matrix form (i.e. Japanese Patent Publication No.1993-84347 (laid open), pp. 1-7).

According to this pachinko machine, dynamic images can be displayed by making full use of the glass board disposed in front of the gaming board and without limiting the display area by units or apparatuses located on the gaming board.

However, according to the pachinko machine irradiating colored light from the reverse side of the liquid crystal sheet through the optical fibers or the color filters, there is a problem that the structure of the pachinko machine becomes complicated and production costs more in order to have more colors. On the other hand, the image becomes monotonous if fewer colors are used. Therefore the purpose of displaying dynamic images by making full use of the glass board disposed in front of the gaming board cannot be achieved.

According to the pachinko machine irradiating colored light from the reverse side of the liquid crystal sheet with LEDs arranged in the matrix form, there is a problem that the structure of the pachinko machine becomes complicated and production costs more, as numerous LEDs are arranged on the gaming board. As a result, since pegs cannot be arranged on a part where the LEDs are arranged, the pachinko machine cannot solve the problem that the area where pegs can be arranged becomes small and the motion of the launched balls becomes monotonous.

According to the method to irradiate colored light from the reverse side of the opaque liquid crystal sheet, it is difficult to display the image clearly and vividly. This hence tires the player and gives the player a difficulty in enjoying the game for a long period of time. Also, due to the opaque liquid crystal sheet, a new problem arises that the player has difficulty in playing the pachinko game, as being unable to see the ball falling down the gaming board.

SUMMARY OF THE INVENTION

The present invention has been made in view of the above problem, and the purpose of the present invention is to provide a gaming machine which can display dynamic, high quality images without limiting the display area by having units or apparatuses located on the gaming board. Moreover, the purpose is to provide the

gaming machine which can provide more exciting pachinko game by providing various falling routes for the launched ball, where the player can enjoy the game for a long period of time.

To achieve the above purpose, the present invention provides the gaming machine having a display unit disposed behind a gaming board, an area of the gaming board where the display unit is disposed has high transparency.

Specifically, the present invention provides the gaming machine described below.

(1) A gaming machine comprises a gaming board which has at least one winning hole whereby a prescribed number of balls are paid out as the ball falls into the winning hole, and a display unit which displays images of the variable display game, a single game of which starts out with a plurality of symbols being variably displayed and ends with the stopping of the variable display of the plurality of symbols. The display unit is disposed on the reverse face of the gaming board and at least a part of the gaming board behind which the display unit is disposed has transparency.

According to the present invention described in (1), the image can be displayed by making use of the gaming board itself, and it can be displayed on a larger display area than in a conventional display unit, as the display unit comprised of a plastic liquid crystal or liquid crystal panel etc. is disposed on the reverse face of the gaming board, and an area of the gaming board where the display unit is disposed has high transparency. As a result, a dynamic image can be displayed. A player can enjoy a game for a long period of time without being bored, as the image can be displayed clearly with high quality compared to a conventional pachinko machine which displayed the image by irradiating colored light from the reverse side of an opaque liquid crystal sheet. The gaming machine can make a pachinko game more exciting, and provides various falling routes for the launched ball, as it is unnecessary to locate the display unit on the gaming board, and the falling routes of the launched ball are not limited.

Moreover, the present invention provides the gaming machine (2) described below. The gaming machine described above (1) comprises the display unit disposed on an entirety of the reverse face of the gaming board which has transparency.

According to the present invention described in (2), the gaming machine can display not only dynamic images that provide a sense of being there but also new images which could not be performed by the conventional gaming machine such as the variable display of the symbols performed by making full use of the entirety of the gaming board. As a result, the gaming machine can make the player pay attention to the images or symbols, and make the player become absorbed in the pachinko game. In the conventional gaming machine, the gaming board itself had to be changed in order to change the design of the gaming board, but according to the gaming machine described in (2), it is relatively easy to change a type of machine because a design of the

gaming board can be changed by changing the image displayed on the display unit. The gaming machine can decorate the gaming board by displaying an animation on the display unit which could not be performed conventionally.

It is necessary to form opening for the winning hole and starting hole on the gaming board. Therefore, it is necessary to make a space between the gaming board and the display unit, and to form the opening on the gaming board to dispose the display unit on the whole reverse face of the gaming board. A ball fallen into the winning hole or starting hole can be detected by an optical sensor which detects a passing of the ball from the interception of rays such as infrared rays or from difference in reflected rays.

[Definition of terms]

The “variable display” refers to a state where the symbols are displayed so as to change from one to another (i.e. a symbol “7” changes to another symbol “8” or a symbol “9” changes to another symbol “star”), a state where the symbols are displayed so as to change gradually one from another (i.e. a symbol “7” moves from one side to another following another symbol “6”). The “symbols” is information which can be recognized by sight such as characters, marks or patterns etc.

The “display unit” displays the image of a variable display game, a single game of which starts out with the variable display of a plurality of the symbols and end with the stopping of the variable display of the plurality of the symbols. The image may include a fixed image or an animation besides the image of variable display game. The display unit described above is a plastic liquid crystal or liquid crystal panel etc., but it is not restricted to these.

The “liquid crystal panel” displays the images, and is comprised of a liquid crystal layer, alignment layers located on both sides of the liquid crystal layer, transparent electrodes, color filters, glass panels holding these layers, polarizing panels located on the outside of the glass panels. Hereinafter, the liquid crystal layer, the alignment layers, transparent electrodes and color filters are called “liquid crystal layer etc.” The liquid crystal panel is not limited and any known liquid crystal panel can be used in the present invention.

The “plastic liquid crystal” is comprised of plastic panels instead of the glass panels in the liquid crystal panel described above. The plastic liquid crystal is not limited and any known plastic liquid crystal can be used in the present invention. Either of the liquid crystal panel and the plastic liquid crystal can be used in the present invention. Which one is used can be determined by taking production costs and impact resistance into consideration. Hereinafter, the liquid crystal panel or the plastic liquid crystal is disposed as the display unit. The liquid crystal panel and the plastic liquid crystal are called the “liquid crystal panel etc.” in the present invention.

A size of the liquid crystal panel etc., disposed on the gaming machine of the present invention is not limited, if it is disposed within the reverse face of the gaming

machine. A location of the liquid crystal panel etc. is not limited, if it is disposed on the reverse face of the gaming machine. The size and the location of the liquid crystal panel etc. are determined by taking into consideration on production costs, the size of the images which excite the player and show the variable display game etc. The liquid crystal panel etc., disposed on the gaming machine of the present invention is not limited to a single panel but a plurality of the liquid crystal panel etc., can be disposed. The method of driving the liquid crystal panel etc., can be any known method. Examples of the method include, but are not limited to, active matrix driving method, passive matrix driving method and dynamic driving method, and the like. A backlight irradiating light to the liquid crystal panel etc. is not limited. The method of irradiation is any known method such as a reflector method, a photo conductor method and spread light method etc.

The “transparency” refers to that the gaming board has efficient transparency for the images displayed on the display unit disposed on the reverse face of the gaming board to be seen through the gaming board. The transparent portion of the gaming machine is not necessarily colorless and it may have some colors or some patterns. It is preferable that the transparent portion of the gaming machine has a transmittance rate of 30% or more, and it is more preferable that the transparent portion of the gaming machine has a transmittance rate of 50% or more.

It is preferable that material of the gaming board is comprised of a resin, so that the pegs can be located on the surface of the gaming board relatively easily. The gaming machine can provide the exciting pachinko game and provide various falling routes for the launched ball, as the pegs are located on the part of the gaming board behind which the display unit is disposed. Especially, it is preferable that the material of the gaming board is comprised of a soft resin with a view to locating the pegs easily.

According to the gaming machine of the present invention, the image can be displayed by making full use of the gaming board itself and displayed on larger area than the area of the conventional display unit, as the display unit is disposed on the reverse face of the gaming board and the part of the gaming board which the display unit is disposed behind has high transparency. As a result, dynamic images that provide the sense of being there can be displayed. The player can enjoy the game for a long period of time without becoming bored, as the image can be displayed vividly with high quality. The gaming machine can make a pachinko game more exciting, and provide various falling routes for the launched ball, as it is unnecessary to dispose the display unit on the gaming board, and the falling routes of the launched ball are not limited.

BRIEF DESCRIPTION OF DRAWINGS

Fig.1 is a front side view showing an example of a pachinko machine according to the present invention.

Fig.2 is an expanded front side view showing an example of a gaming board of a gaming machine according to the present invention.

Fig.3 is a perspective view showing an example of a transparent portion of a gaming board and a liquid crystal panel according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

An embodiment of the present invention will be explained below with reference to the drawings. Fig.1 is a front side view showing a pachinko machine according to the present invention. In the embodiment explained below, the present invention is applied to the pachinko machine as a preferable embodiment of a gaming machine according to the present invention.

The pachinko machine 10 is comprised of a frame 12, a gaming board 14 built in the frame 12, a window frame 16 of the frame 12 located in front of the gaming board 14, an upper receiver 20 and a lower receiver 22 located in front of the frame 12 below the window frame 16 and a launching handle 26 located on the right side of the lower receiver 22.

The gaming board 14 is comprised of a transparent resin such as an acrylic resin, or the like. A sheet painted with some illustrations, symbols, or the like, is pasted on a part of the reverse face of the gaming board 14. The gaming board 14 has a hole on a portion thereof. Therefore, the part of the gaming board 14 has transparency (transparent portion 14a). A display unit comprised of a liquid crystal panel 32 driven by the active matrix driving method and a backlight 80 irradiating light to the liquid crystal panel 32(see Fig.3) is disposed on the reverse face of the transparent portion 14a. The liquid crystal panel 32 is the display unit that displays images of a variable display game, a single game of which starts out with the variable display of a plurality of the symbols and ends with the stopping of the variable display of the plurality of the symbols.

A plurality of pegs is located on the gaming board 14, including the transparent portion 14a. The pachinko machine 10 includes a so-called pachi-com machine (pachinko computer) in this embodiment. The launching handle 26 is rotatably located on the frame 12. Therefore, a player can perform a pachinko game by operating the launching handle 26. A launching motor 28 is located behind the launching handle 26. Electric power is provided to the launching motor 28, when the launching handle 26 is operated clockwise. As the launching handle 26 is operated clockwise, the balls stored in the upper receiver 20 are launched onto the gaming board 14 one after another.

The launched ball moves to the upper area of the gaming board 14, guided by a guide rail 30. After this, the launched ball collides with the pegs as it falls, changing its direction.

In the conventional pachinko machine, the launched ball does not pass a middle area of the gaming board, as the display unit is disposed on the middle area of the gaming board. However, according to the pachinko machine 10 of the present invention, since the middle area of the gaming board 14 is comprised of the transparent portion 14a where the liquid crystal panel 32 is disposed on the reverse side and the pegs are located on the front side, the pachinko machine 10 ensures a wide area for a falling route of the launched ball and provides various falling routes of the launched ball.

Fig.2 is an expanded front side view of the gaming board 14. Numbers for elements shown in Fig. 2 correspond to the numbers of the elements shown in Fig. 1. In Fig. 2, the pegs described above are omitted.

The display unit comprised of the liquid crystal panel 32 is disposed on the reverse face of the transparent portion 14a formed on the middle area of the gaming board 14. The liquid crystal panel 32 displays images decorating the gaming board 14, images to excite the player, images of the variable display game, and so on. The liquid crystal panel 32 also displays identification images displayed on so-called sub-digital display unit or the number of the variable display games etc.

In Fig. 2, the liquid crystal panel 32 displays the pattern corresponding to the pattern of the gaming board 14, four pigs, the symbols ("7"- "6"- "7"), and the images showing the number of stored variable display games (four hearts). As described above, the liquid crystal panel 32 can display the pattern corresponding to the pattern on the transparent portion 14a except for the transparent portion 14a. Therefore, the image displayed on the display unit and the pattern on the gaming board can be integrated. As a result, the pachinko machine 10 can give the player impression of the large gaming board and excite the player by the images being integrated with the gaming board.

A big winning hole 38 is located on the lower area of the transparent portion 14a. A shutter 40 is located nearby the big winning hole 38. The shutter 40 is driven so as to open intermittently, by a solenoid (not shown in figure), when the big winning has occurred. An out hole (not shown in figure) located below the big winning hole 38 receives the launched balls which do not fall into the winning holes etc.

Normal winning holes 54a and 54b are located on the right side and left side of the transparent portion 14a described above. Normal winning holes 54c and 54d are located on the right-lower side and left-lower side of the transparent portion 14a. Special winning holes 56a and 56b are located on the right edge and left edge of the gaming board 14. Special winning holes 56c and 56d are located on the right side and left side of the big winning hole 38.

A prescribed number of the balls are paid out to the lower receiver 22 when the launched ball falls into one of these winning holes (the normal winning holes 54a through 54d and the special winning holes 56a through 56d). The identification images (e.g. numbers and symbols) displayed on the so-called sub digital display unit are variably displayed on the liquid crystal panel 32, when the launched ball falls into a prescribed winning hole included among the normal winning holes 54a through 54d and the special winning holes 56a through 56d. When the identification images stop at prescribed images, a starting hole 44 opens for a prescribed period of time by driving moveable pieces located on both sides of the starting hole 44 so that the launched ball can easily fall into the starting hole 44.

The starting hole 44 is located below the transparent portion 14a. The starting hole 44 has a ball-detecting sensor 42 detects a trigger to display a plurality of symbols (e.g. three symbols) variably. When the ball-detecting sensor 42 detects a passing ball, a prescribed number of the balls are paid out and the variable display of the symbols starts on the liquid crystal panel 32. That is to say, the variable display game starts out.

Guide apparatuses 60a and 60b for guiding the launched ball to a certain direction are located on the right side and the left side of the liquid crystal panel 32. Lamps 36a and 36b are located on the outside area of the right upper and left upper of the gaming board 14.

The liquid crystal panel 32 will be explained below with reference to the drawing. Fig. 3 is a perspective view of the liquid crystal panel 32 and the transparent portion 14a of the gaming board 14. Sockets 91 are provided on the front side of the transparent portion 14a comprised of an acrylic resin, and the pegs 90 are inserted into the sockets 91. As a result, the pegs 90 are located on the whole surface of the gaming board 14. Therefore, the pachinko machine 10 can provide various falling routes for the launched ball and provide an exciting pachinko game, as the pegs 90 can be located on the front side of the transparent portion 14a behind which the liquid crystal panel 32 is disposed.

With reference to Fig. 3, the liquid crystal panel 32 is comprised of a liquid crystal layer 75 provided with a liquid crystal 73 and a spacer 74 in the middle. An alignment layer 72a having a number of vertical trenches, a transparent electrode 77, color filters 78a~78c having three colors (red, green, and blue), a glass panel 70a and a polarizing filter 71a are layered in this order on the front side of the liquid crystal layer 75. On the other hand, an alignment layer 72b having a number of vertical trenches, a layer comprised of a transparent electrode 76 and a switching device 79, a glass panel 70b and a polarizing filter 71b are layered in this order on the reverse side of the liquid crystal layer 75. It is not shown in the figure but liquid crystal 73 and spacer 74 are held between the alignment layer 72a and the alignment layer 72b by the sealing material enclosing the liquid crystal layer 75.

The transparent electrode 77, the transparent electrode 76 and the switching device 79 are connected to the display unit (not shown in the figure) formed inside the pachinko machine 10. The display unit is connected to the controller (not shown in the figure) formed inside the pachinko machine 10. The display unit works by instruction signals from the controller, provides electric power to the transparent electrode 77, the transparent electrode 76 and the switching device 79.

The backlight 80 is located against the alignment layer 72b having some space between the reverse side of the alignment layer 72b. The backlight 80 is comprised of a spreading sheet 83 located on the front side of the backlight 80, a photo conductor 81 having a reflector 82 on the reverse side thereof and cold cathode fluorescent substances 84a and 84b irradiating white light to the photo conductor 81. The white light irradiated to the surface of the photo conductor 81 by the cold cathode fluorescent substances 84a and 84b is spread uniformly by the reflector 82 and the spreading sheet 83 located on the surface of the photo conductor 81, and provided to the liquid crystal panel 32. The light irradiated by the cold cathode fluorescent substances 84a and 84b is shown as dotted arrows in the figure.

As described above, when electric power is provided to the transparent electrode 77, the transparent electrode 76 and the switching device 79 and the white light spread uniformly is provided from the backlight 80, the images shown in Fig. 1 are displayed on the liquid crystal panel 32.

In this embodiment, the liquid crystal panel 32 is disposed on the reverse side of the transparent portion 14a exists on the middle area of the gaming board 14, but it may be disposed on the reverse face of the gaming board 14 where the launched ball does not pass.